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$$=(a/g)\int_0^{2\pi}\sqrt{(g+2c)^2-8cg\cos^2(a\theta/g)}\,d\theta.$$

Let $\frac{1}{2}\pi-\phi=a\theta/g$.

$$\therefore\ s=(g+2c)\int_{(\pi/2g)(g-4a)}^{\frac{1}{2}\pi}\sqrt{1-\frac{8cg}{(g+2c)^2}\sin^2\phi}\,d\phi$$

$$=(g+2c)E_{(\pi/2g)(g-4a)}^{\frac{1}{2}\pi}\left(\frac{2\sqrt{(2cg)}}{g+2c},\ \phi\right).$$

**Also solved by *WALTER H. DRANE*.**

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# PROBLEMS FOR SOLUTION.

## ARITHMETIC.

**118. Solution by J. F. TRAVIS, Student in Ohio State University, Columbus, O.**

The present worth of a note due January 1, 1896, was $74,200, when discounted at 4% true discount. The present worth of another note, due July 1, 1896, whose face value was the same as that of the first note, was $68900 when discounted at 8% true discount. Find the face of the notes and the date when given, supposing the second note to have been given the same day the first note was. Solve by arithmetic.

**119. Proposed by G. B. M. ZERR, A.M., Ph.D., Professor of Mathematics and Science, Chester High School, Chester, Pa.**

The cost of an article is $\$1.\frac{9}{.001}$. The selling price $1,000. What is the gain per cent.?

*** Solutions of these problems should be sent to B. F. Finkel not later than November 10.

## ALGEBRA.

**107. Proposed by CHARLES MYERS, Canton, Ohio.**

Given $xyz=18\ldots.(1)$; $x^2+y^2+z^2=33\ldots.(2)$, and $(x^2-yz)^3+(y^2-xz)^3+(z^2-xy)^3-3(x^2-yz)(y^2-xz)(z^2-xy)=6561\ldots.(3)$, to find $x$, $y$, and $z$.

**108. Proposed by GEORGE LILLEY, Ph.D., LL.D., Professor of Mathematics, State University, Eugene, Or.**

A gave two notes; one for $a$ dollars at $m$ per cent., and the other for $b$ dollars at $n$ per cent., annual interest. He is to make a monthly payment of $c$ dollars. How much must be endorsed on each note in order to pay them off at the same time? What must be the endorsement on each if $a=1900$, $b=1800$, $m=6$, $n=7$, and $c=25$?

*** Solutions of these problems should be sent to J. M. Colaw not later than November 10.